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The Exploration of Design Driven Innovation as a Dynamic Capability

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ABSTRACT

Innovation enables companies to attain consistent organic growth that brings benefits to stakeholders. Design thinking approach in innovation has been emergent to be an alternative to technological development path in order to generate competitive and successful product or service in the market place. Design driven innovation combines functional and semantic dimensions of products or services in the marketplace. Previous research has recently revealed practices of design driven innovation in various industries. However, little is known to the extent that companies in Indonesia practicing design driven innovation. A theoretical framework with perspective from dynamic capability theoretical lens and guided by Dubin's theory building methodology is proposed to explain the constructs and role of design in the process of innovation. The research is expected to contribute a new construct to the existing framework, namely construct that related to how we could assess the value of the design-driven innovation output, perceived by the costumers.

Keywords: design driven innovation, dynamic capabilities, theory building

1. Introduction

Successful introduction of new products into the market is determined by the accumulation of two main expertise, i.e. market expertise, technological expertise, and in addition to that, the expertise of the firm in creating innovative combination between the two (Kogut & Zander, 1992). Therefore, in general, there are also two main strategies towards innovation: market-pull and technology-push (Dosi, 1982). In the market-pull approach the knowledge about market plays a more important role than technologies.

The main source of innovation is the voice of the market and the new product development is a direct consequence of explicit needs expressed by the consumers. One important assumption that should not be forgotten here is that user needs are explicit elements that should be identified and translated into new products. User-centered is one specific approach of market pull strategy which emphasizes that product development should start from a deep analysis of user needs. A company can successfully innovate by asking users about their needs or by observing them as they use existing products and by tracking their behavior in consumption processes (Sigolotto, 2010).

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On the other hand, the technology-push approach argues that the source of innovation comes from the research and development activities of the company and the identification and development of new technologies based on the previous research work. Rather than being driven by the market, innovation stems from the company's research and development activities that, through the identification and development of new technologies, allow it to create new products (Abernathy & Clark, 1985; Henderson & Clark, 1990).

In addition to the two previous approaches, Verganti (2008) identify a third one: the design driven innovation process. Design-push approach is complementary to market pull and technology-push. In the design-push approach, innovation stems from a third knowledge source, "The knowledge about the signs that can be used to deliver a message to the user and about the socio-cultural context in which the user will give meaning to those signs." (Verganti, 2003; 2006). In this approach, the semantic dimension that guides the innovation process plays a more important role rather than the market or the technology. In a design-driven strategy the crucial aspect of innovation concerns the capability to understand, anticipate and influence the emergence of new product meanings.

The authors specifically interested in studying the design-driven innovation (DDI) because research which more focus on the role of design in innovation will be able to give an idea on how far the design has become a strategic weapon in producing high value-added products. Comparing to the technology road, design road has two advantages especially for developing country like Indonesia, i.e. cost and likelihood of success. For the design approach, the main investment we need is mostly only the things for improving skills, but for the technology approach we need both human skills and tools. For the second reason, Indonesia has a great potential of creativity that has been proven from history and creativity is closely related to design. The purpose of this paper is adopt the dynamic capabilities framework as a theoretical lens in observing design-driven innovation process, by first studying how this theory already applied in another case. This paper systematically arranged as follows: first we explain the specificity of design-driven innovation among different innovation approaches followed by picturing DDI in integrative way with its business ecosystem. Then we overviewed a special example of application of dynamic capability perspective on a case similar with DDI. We will apply the same methodology to DDI in developing a theoretical framework which in the next stage will be used to explain how design takes a leading role in innovation.

2. Design Driven Innovation (DDI)

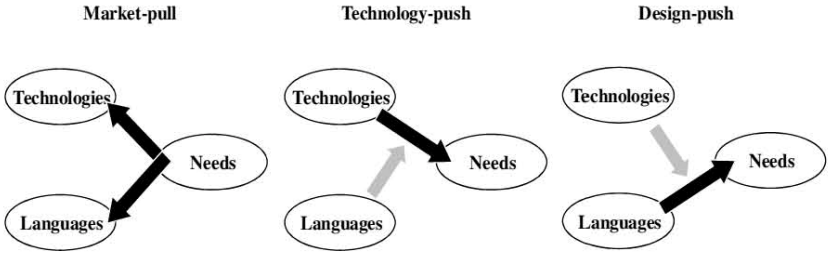
Verganti defines the radical design driven innovation as: *"an innovation where novelty of message and design language is significant and prevalent compared to novelty of functionality and technology."* Radical innovation of meanings doesn't come from user-centered approaches. Design-driven innovations are instead proposals, which however, are not dreams without a foundation. They end up being what people were waiting for, once they see them. They often love them much more than products that companies have developed by market pull strategy through scrutinizing users' needs. Figure 1 clearly identifies the differences between the three already mentioned strategies, where colors and directions of arrows show up the peculiarities of the three approaches towards innovation.

The concept of meaning is normally related to language. But in very natural way people attach meanings also to products. According to Verganti (2008) a product's language is its material, texture, smell, name, and finally form. From this idea of the language of things he builds a model for investigating design and innovation, a product appeal to people and their needs along two dimensions: function and sense. Function is

directly connected to the "constitution" of products—their technology. Sense is embedded in language of things. Function leads to performance and sense to meaning. Hautamaki (2010) formulated it as: *[Function + Sense] => [Performance + Meaning] => [Needs of People]*

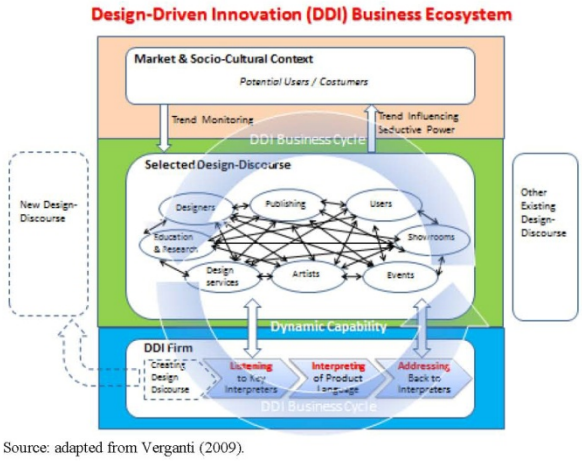
3. DDI Business Ecosystem

To produce radical innovation is often not possible without radical researchers, who "envision and investigate new product meanings through a broader, in-depth exploration of the evolution of society, culture, and technology" (Verganti, 2008). They are interpreters who are able to envision how people could give meaning to things through intense involvement in the design discourse. Design discourse is a circle or network of people and organization that are engage in a continuous dialogue about new products, people's need and values. In this ecosystem there are artists, cultural organizations, media, retail and delivery firms, designers, architects, technology suppliers, research and educational institutions etc. In design-driven innovation, firms must listen to interpreters, who see the envisioned context of life. It is not enough to observe users in their current contexts. But just listening to the interpreters is still not enough for success. *"This knowledge [from interpreters] then must feed a process through which a company creates its own vision and proposal; internal research and experiments that allow the firm to eventually develop a radical new meaning and language."* (Verganti, 2008).



Source: Verganti (2003).

Figure 1. Knowledge Drivers in Different Approaches to Innovation



Source: adapted from Verganti (2009).

Figure 2. DDI Business Ecosystem

The first one is *listening*. It is the action of gaining access to knowledge about possible new product meanings by interacting with interpreters. Key interpreters are forward-looking researchers who are developing, unique visions about how meanings could evolve in the life context we want to investigate. Firms that realize design-driven innovations are better than their competitors at detecting, attracting, and interacting with key interpreters. The second action is *interpreting*. It is the internal process through which the firm assesses the knowledge it gains by interacting with interpreters and then recombines and integrates this knowledge with its own proprietary insights, technologies, and assets.

This process reflects the profound and precise dynamics of research rather than the speed of brainstorming. It resembles the process of science and engineering (although it targets meanings rather than technologies) more than that of a creative agency. Its outcome is the development of a breakthrough meaning for a product family.

The third action is *addressing*. Radical innovations of meanings, being unexpected, sometimes initially confuse people. To prepare the ground for groundbreaking proposals, firms leverage the seductive power of interpreters.

4. Dynamic Capability Perspective

As already explain previously, the third key expertise for successful introductionof new products into the marketbeside market expertise andtechnological expertise is expertise of the firm in creating innovative combination between the two (Kogut & Zander, 1992). Nowadays, the firm's ability to combine and effectively use different types of knowledge is becoming more a more crucial to its success in innovation 580 activities and performance (Henderson & Cockburn, 1994; Verona & Ravasi, 2003). Teece *et al*. (1997) propose a terminology for this kind of ability to build and integrate resources and capabilities in order to create new forms of innovative combinations in anticipating the changing market requirements as dynamic capabilities. The definition of dynamic capability in his own word is:

"*the company's ability to integrate, build and re-configuring internal and external competencies to face the business environment changes quickly.*"

There are various definition proposed by several experts afterwards, but in general, various modifications to the definition of dynamic capabilities are more or less closely related to the framework developed by Teece *et al*. (1997) above.

The dynamic capabilities of the firm consist of tangible and intangible assets, and the knowledge and processes needed for recognizing new business opportunities and orchestrating its resource portfolio in conditions of change (Teece *et al*., 1997; Zahra & George, 2002). Wang and Ahmed (2007) identified three component factors that are common across several industries, although firms have different processes for developing them: the ability to take in external knowledge (absorptive capability), to link the firm's innovativeness to products and markets (innovative capability), and to adapt and align resources and capabilities (adaptive capability).

Verona and Ravasi (2003) also found that three types of dynamic capabilities (knowledge creation and absorption, knowledge integration, and knowledge reconfiguration) were needed for successful product innovations. Teece (2007) grouped the main dynamic capabilities of the firm into three categories: sensing, seizing and reconfiguring. Sensing capabilities denote the firm's activities in scanning and monitoring changes in operating environments and identifying new opportunities. Seizing capabilities are needed

in activities such as designing product architecture and business models, brand management, and building an organization that reinforces creativity and innovativeness. The dynamic capabilities framework argues that competitive advantage not necessarily stems from scarce difficult-to-imitate firm-specific assets, but from how they are configured creatively by managers. Reconfiguring capabilities are useful in asset "orchestration", i.e. activities such as the redeployment of existing assets, and the management of complementary assets or reengineering processes. Indeed, Eisenhardt and Martin (2000) conceptualize dynamic capabilities as a set of specific and identifiable strategic and organizational processes through which firms within dynamic markets manipulate resources into value-creating strategy.

In line with the description of dynamic capability perspective above, DDI can be considered as a kind of dynamic capability with basic argument that there is strong analogy between main process of DDI especially listening and interpretingwith main processes of dynamic capability (sensing, seizing, reconfiguring) proposed by Teece *et al*. (1997) as shown in Table 1 below.

Table 1. Analogy of Key Processes between Dynamic Capability and DDI

Dynamic Capability (Teece *et al*.,2007)	Design Driven Innovation (Verganti, 2009)
Sensing activities in scanning and monitoring changes in operating environments and identifying new opportunities	*Listening* access to knowledge about possible new product meanings by interacting with interpreters who are forward-looking researchers developing unique visions about how meanings could evolve in the life context we want to investigate
Seizing designing product architecture and business models, brand management, and building an organization that reinforces creativity and innovativeness	
Reconfiguring how assets are configured ("orchestrated") creatively by managers, i.e. activities such as the redeployment of existing assets, and the management of complementary assets or reengineering processes	*Interpreting* assesses the knowledge it gains by interacting with interpreters and then recombines and integrates this knowledge with its own proprietary insights, technologies, and assets

When we consider DDI as a kind of Dynamic Capability then logically we could extend the theory to explore further the DDI phenomenon with different view than what currently exist and this is one of the contributions of this paper. Verganti, as one of the forefront researcher in DDI also encourage those researchers who are interested in this field to do exploration like this, as he stated in his paper: "*The aim of this article therefore is not to provide a final answer …, but rather to propose new lenses to activate a stream ofresearch on this phenomenon for which scholars hardly have a theory."* (2008: 7).

Dynamic capability approach has been adopted in the literature for looking into a 581 number of phenomena such as new product development (Deeds *et al*., 2000), IT business innovation (Wheeler, 2002), external

knowledge acquisition (Zahra & George, 2002), innovation (Jantunen, 2005), and alliance formation (Rothaermel & Deeds, 2006). One interesting application of Dynamic Capability theory that the authors would like to refer is NEBIC (Net-enabled Business Innovation Cycle) theory proposed by Wheeler (2002).

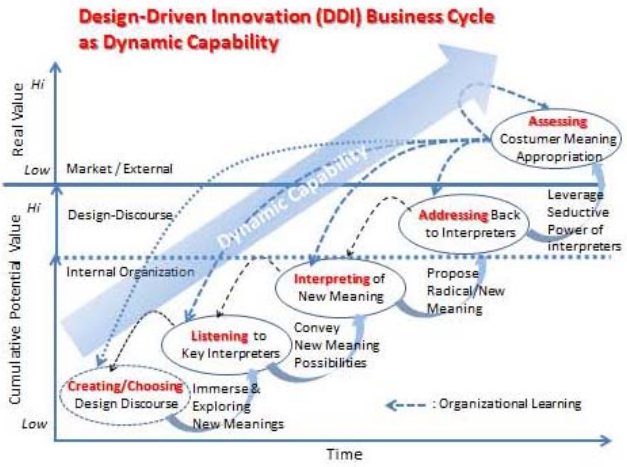
The reasons we choose this theoretical perspective are, firstly, the focus of this theory is innovation which is in line with our topic, and secondly, this theory clearly included costumer value as one of its construct which we appreciate because that was the businesses are for and so far still not elaborated much in the state-of-the-art of research in the DDI.

5. Overview of Net-enabled Business Innovation Cycle (NeBIC)

Net-enabled Business Innovation Cycle (NeBIC) is an applied dynamic capabilities theory for measuring, predicting, and understanding a firm's ability to create customer value through the business use of digital networks, which identifies four sequenced constructs: Choosing new IT, Matching Economic Opportunities with technology, Executing Business Innovation for Growth, and Assessing Customer Value, along with the processes and events that interrelate them as a cycle (Wheeler, 2002). The objective of the development of this theory are, first, to provide venue to address the basic mission and purpose of every business which is satisfying costumer (creating Costumer Value) (Drucker, 1974), and secondly, to build sustainable capabilities by identifying and understanding the organizational level routines that drive Net-enabled business innovation towards the creation of costumer value in consistent and reliable way (Wheeler, 2002).

6. DDI Business Cycles Framework

As we already shown in Table 1 that DDI is a kind of dynamic capability, and in section V above we pick one of the existing elaboration of dynamic capability theory, namely NEBIC, that we consider support the very basic purpose of any business that often not exclusively stated or even worst forgotten, now, extending our previous logical thinking, we will map the existing process of DDI proposed by Verganti (2008) with some additional processes, into a new framework as *DDI Business Cycle* shown in Figure 3 below. The existing process of DDI are listening to design discourse, interpreting the new meaning and addressing back to key interpreters and in order to make it in full cycle like NEBIC we add Assessing Costumer Value, which will be explained in subsequent paragraph.



Source: adapted from Wheeler (2002).

Figure 3. DDI Business Cycle

We follow the same theory development approach which developed by Dubin (1978) and widely used methodology for theory building. Dubin's methodology for theory building consist of eight elements: (1) units whose interactions constitute the subject matter of attention, (2) the laws of interactionamong the units, (3) the boundaries within which the theory is expectedto hold, (4) the system states in each of which the units interact differently witheach other, (5) the propositions of the theory, (6) empirical indicators, (7) the hypotheses derived from the theory, and (8) empirical research to test thetheory. Dubin divides the theory building research model into two parts: *theory development* (steps 1-4) and *research operation* (steps 5-8). This paper will focus just on theory development (steps 1-4) part with some preliminary sample of step 5. For this paper, we prefer to use terminology of constructs instead of unit.

6.1 Constructs of the Theory of DDI Business Cycle

According to Dubin (1978), any researcher has unlimited opportunities to employ constructs of his [or her] choice on developing his (her) theory.

Usually, the constructs of the theory resembling the building blocks of the theory and in this case are derivedfrom DDI concept that has been explained above. The constructs of a theory of DDI Business Cycle thus (1) activating design-discourse, (2) listening to the design discourse, (3) interpreting the product language, (4) addressing to the key interpreters, and (5) assessing costumer value perception.

Construct 1: activating design-discourse

As Verganti (2008) suggests that the existence of a design-discourse are crucial for DDI, we need to make sure that there is at least one active design-discourse in our business ecosystem and we participate actively or immersed ourselves in the discourse, and if there is none available yet, we better create one. How to develop a new design-discourse from scratch is beyond the scope of this paper but the elements (individuals and groups) are already shown in Figure 2.

Construct 2: listening to the design discourse

The main activityis accessing knowledge about possible meanings and languages of new products from active participating in a certain design-discourse. Companies that listen better are those that developed privileged relationships with a distinguished group of key interpreters. Key interpreters are forward-looking researchers who are developing unique vision about how meaning could evolve in the

life context we want to investigate (Verganti, 2009).

Construct 3: interpreting the product language

It is the process through which the company assesses the knowledge it gains from interacting with interpreters and then recombines and integrates this knowledge with its own proprietary insights, technologies, experience and assets (Verganti, 2009). This is the core of dynamic capability in DDI that should be mastered in order to enable the company developing a unique proposal with a breakthrough meaning for a new product family.

Construct 4: addressing to the key interpreters

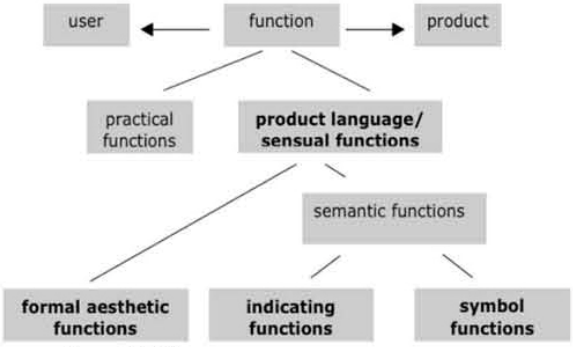
Since the target of this DDI is to propose a radical innovation of meanings, company should be careful in introducing it to the people, otherwise it easily confuse them. The wiser way is by leveraging the seductive power of interpreters. By discussing and internalizing the new product vision, these interpreters could change the social context in a way that makes the proposal more meaningful and attractive to the people (Verganti, 2009).

Construct 5: assessing costumer value perception

Costumer Value is the very basic purpose of any business that often not exclusively stated or even worst forgotten, in many business process, therefore here we propose it as an exclusive unit as already indicated in an example of a dynamic capability driven model—NEBIC—previously. Here customer value is assessed via three classes of measures: financial, perceptual, and behavioral measures (Wheeler, 2002).

Financial indicators such as balance sheets and income statements are lagging indicators. Perceptual measures focus on customer satisfaction or product evaluation surveys tap into psychometric beliefs, attitudes, and intentions. Behavioral measures represent a third way of measuring customer value. While financial measures report outcomes and perceptual measures assess intent, behavioral measures provide insight regarding the actual choices and decision processes used. Since DDI strategy based on radical innovation of product meaning, the behavioral measure would be the most appropriate measure.

How to develop this specific measure is beyond the 583 scope of this paper but what are the elements that should be included could be referred to the theory of product language by Gros (1983) who makes a distinction between the practical functions of a product on the one hand, and the product language functions on the other. The product language subdivided into formal aesthetic functions, i.e. those aspects that can be observed irrespective of the meaning of their content and the semantic functions. Then semantic functions subdivided into sign or indication functions and symbolic functions (see Figure 4).



Source: Gros (1976).

Figure 4. Conceptual Model of the Offenbach Theory of Product Language

Associations that come to a person's mind while contemplating an object: for example, societal, socio-cultural, historical, technological, economical and ecological aspects. Since symbols are based on cultural and social conventions and traditions, knowledge of cultural norms and context is crucial for understanding the message and meaning of a product in the way it was intended (Steffen, 2007). It seems rather complicated and abstract, but anyone would like to measure the effectiveness of innovation in product meaning should refer to this theory.

6.2. Laws of Interaction

The laws of interaction describe how the constructs relate to each other. In this research, we apply 2 kinds of laws proposed by Dubin (1978: 98-101), first, *categorical law* of interaction which states that values of a construct are associated with values of another construct, secondly *sequential law* of interaction which defined as a law that is always employing atime dimension to order the relationship among two or more constructs. All constructs are linked with categorical laws, as a change in any construct will provoke a change in at least oneother construct. All constructs are also linked with sequential laws to stress the importance of the time element in DDI process.

6.3. Boundaries

The determination of the boundaries requires theidentification of the domains in which the theory operates (Dubin, 1978). In identifying the boundaries, the theoristmust also make the logic used to determine those boundaries explicit. If we refer to Figure 2, there are several potentialboundaries concerning the practice and theory of DDI business cycle: (1) design discourse boundary, (2) DDI firm boundary, (3) a performance system boundary, and (4) DDI firm and contextual environment boundary. All boundaries in the theory are open boundaries; indicating that the system constantly exchanges information and resources among all domains.

6.4. The System States

Dubin (1978) defines system states that describe the values of constructs with some persistence through a period of time. In considering the relationships among the constructs, we will simplify the states of the constructs by referring to them as having categorical values of low, medium, or high (Wheeler, 2002). First of all, in this framework, construct 1: activating design-discourse, is only needed at the beginning of the cycle, therefore will not included in deriving system states for this framework.

From a variance theory perspective for prediction, we could predict that when all four constructs are high, then high customer value will be achieved. If the Listening is low, then the efficacyof high Interpreting, Addressing, and Assessing capabilitieswill be diminished—either through a late awareness of the compressed time for executing, or beinglate to market. In sum, there is sequenced step interdependency among the constructs even when considered from the variance perspective. Table 2 conveys the predicted laws of interaction among the constructs along with the predicted system states.

Table 2. System States based on Variance Theory Approach

Constructs				System States	
Listening Design Discourse	*Interpreting* New Meaning	*Addressing* Key Interpreters	*Assessing* Costumer Value	Costumer Value	Reference Label
H	H	H	H	H	Position A
L	H	H	H	M	Position B
H	L	H	H	L	Position C
H	H	L	H	L	Position D
H	H	H	L	H-M	Position E
2 or more L				**L**	Position F

6.5. Propositions

A proposition may be defined as a truth statement about a model when the model is fully specified in its units; laws of interaction, boundary, and system states (Dubin, 1978). Propositions are predictive statements that follow logically from the previous steps of the theory building method. Thus, propositions can be thought of as the logical consequences or conclusions given the units, laws, boundaries, and system states that have provided structure for the theory (Chermack, 2005). The logical consequences for a theory of DDI Business Cycle, given the previous steps will be as follows:

Proposition 1. Firms with strong capabilities in Listening Design Discourse, Interpreting New Meaning, Addressing Key Interpreters and Assessing Costumer Value will consistently create high levels of customer value.

Proposition 2. Firms with a weak in Listening Design Discourse—though with strong Interpreting New Meaning, Addressing Key Interpreters, and Assessing Costumer Value capabilities—will create moderate levels customer value.

Proposition 3. Firms with a weak Interpreting New Meaning capability—though with strong Listening Design Discourse, Addressing Key Interpreters, and Assessing Costumer Value capabilities—will fail to create substantive customer value.

Proposition 4. Firms with a weak Addressing Key Interpreters capability—though with strong Listening Design Discourse, Interpreting New Meaning, and Assessing Costumer Value capabilities—will fail to create substantive customer value

Proposition 5. Firms with a weak Assessing Costumer Value capability—though with strong Listening Design Discourse, Interpreting New Meaning, and Addressing Key Interpreters capabilities—will create high levels of customer value.

7. Conclusion

Comparing to the technology road, design road has two advantages especially for developing country like Indonesia, i.e. cost and likelihood of success. Technology development need investment both in human skills and tools, while for the design approach, the main investment we need is mostly only the things for improving skills. For the second argument, Indonesia has a great potential of creativity -and creativity is closely related to design -that has been proven from the richness of cultural heritage of Indonesia.

Design Drive Innovation has an inherent characteristics of dynamic capability, therefore, as already proven in various research before, it is a promising and appropriate strategy in facing the global trend of the highly dynamic, if not hyper competitive market.

This research is still in preliminary exploratory stage, the next logical stage will be developing an empirical study to prove the real

evidence of this theory in the real world. In addition to that, as suggested also by one of the research pioneers in this field, Verganti (2008), on the theoretical level, there still open a wide possibility to study the DDI from different theoretical perspective such as structuration theory, complex adaptive system theory or others.

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